REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated November 23, 2010 has been received and its contents carefully reviewed.

By this response, claims 13, 16, 18, 34-35 and 45 are amended, and claims 28-30, 32 and 36-37 are cancelled without prejudice or disclaimer. No new matter is added. Accordingly, claims 13, 16, 18, 34-35, and 45 are currently pending. Reexamination and reconsideration of the pending claims are respectfully requested.

In the Office Action, claims 13, 16, 18, 28-30, 32 and 34-37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Moinpour et al. (U.S. Patent No. 5,901,399, hereinafter "Moinpour") in view of Fishkin et al. (U.S. Patent No. 6,202,658, hereinafter "Fishkin"), Hashimoto et al. (U.S. Patent No. 6,261,378, hereinafter "Hashimoto") and the state of the prior art admitted by the applicants in the specification; and claim 45 is rejected under 3 U.S.C. 103(a) as being unpatentable over Moinpour et al. (U.S. Patent No. 5,901,399, hereinafter "Moinpour") in view of Fishkin et al. (U.S. Patent No. 6,202,658, hereinafter "Fishkin"), and Hashimoto et al. (U.S. Patent No. 6,261,378, hereinafter "Hashimoto"). The rejections are respectfully traversed.

Independent claim 13 is allowable over the cited references at least in that claim 13 recites, inter alia, "first step, moving the substrate between first and second cylindrical brushes, wherein the substrate includes first to fourth side surfaces and upper and lower surfaces; second step, brushing the first and second side surfaces opposite to each other among the first to fourth side surfaces of the substrate with the first and second cylindrical brushes, respectively, wherein the first and second cylindrical brushes are rotated to brush the first and second side surfaces, respectively, to a lower direction or to an upper direction perpendicular to the progress direction of the substrate; third step, moving the substrate between upper and lower brushes; fourth step, cleaning the upper and lower surfaces of the substrate with the upper and lower brushes, respectively, rotation directions of the upper and lower brushes having the same direction as a progress direction of the substrate at all contact points between the upper and lower brushes and the substrate; fifth step, moving the substrate between first and second jetting devices; and sixth

step, jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate".

Independent claim 45 is allowable at least in that claim 45 recites, inter alia, "moving the substrate between first and second side brushes to contact the first and second side surfaces opposite to each other among the first to fourth side surfaces of the substrate; rotating the first and second side brushes to brush the first and second side surfaces, respectively, to a lower direction or to an upper direction perpendicular to the progress direction of the substrate, thereby firstly cleaning the first and second side surfaces; continuously moving the substrate between upper and lower brushes to contact the upper and lower surfaces of the substrate; rotating the upper and lower brushes to clean the upper and lower surfaces, rotation directions of the upper and lower brushes having the same direction as a progress direction of the substrate at all contact points between the upper and lower brushes and the substrate; continuously moving the substrate between first and second jetting devices; and jetting deionized water that carries ultrasonic waves onto the first and second side surfaces of the substrate to secondly clean the first and second side surfaces of the substrate".

Applicants note in claims 13 and 45: 1) a substrate is moved between first and second cylindrical brushes 32, and then first and second side surfaces of the substrates is brushed, 2) the substrate is moved between upper and lower brushes 34 and 36, and then the upper and lower surfaces are cleaned, and 3) the substrate is moved between first and second jetting devices 38, and then deionized water is jetted onto the first and second side surfaces.

Thus, the claimed invention discloses the order of the brushings of the first and second side surfaces, the cleanings of the upper and lower surfaces, and the jettings of the first and second side surfaces are sequentially performed. The substances still remaining in the side surfaces in spite of the brushings by the first and second cylindrical brushes 32 is removed by deionized water of the jetting devices 38.

On the contrary, in Moinpour, brushes 230 and 231, an edge cleaning apparatus 204 and water jet 235 are operated at the same time. Thus, in Moinpour, the substances still remaining in the side surfaces after operating the edge cleaning apparatus 204 and the water jet 235 can't be removed any more. In other words, in Moinpour, there is no additional apparatus for removing the substances still remaining in the side surfaces after operating the edge cleaning apparatus 204 and the water jet 235.

In Fishkin, brushes 51a and 51b and edge nozzles 35 and 36 are operated at the same time. Thus, in Fishkin, the substances still remaining in the side surfaces after operating the edge nozzles 35 and 36 can't be removed any more. In other words, in Fishkin, there is no additional apparatus for removing the substances still remaining in the side surfaces after operating the edge nozzles 35 and 36.

Additionally, in the claimed invention, the first and second side brushes are rotated to brush the first and second side surfaces, respectively, to a lower direction or to an upper direction perpendicular to the progress direction of the substrate.

On the contrary, Moinpour discloses that the edge cleaning apparatus 204 is rotated to the same direction as the rotation direction of the wafer 202.

Thus, in the claimed invention, as a frictional force between the brushes 32 and the side surfaces of the substrate is highly strong, the substances of the side substances is more easily removed than those of Moinpour.

Furthermore, in the claimed invention, rotation directions of the upper and lower brushes have the same direction as a progress direction of the substrate at all contact points between the upper and lower brushes and the substrate.

On the contrary, in Moinpour, while rotation directions of the brushes 230 and 231 have the same direction as a rotation direction of the wafer 202 at one half portion of all contact points between the brushes 230 and 231 and the wafer 202, the rotation directions of the brushes 230 and 231 have a direction opposite to the rotation direction of the wafer 202 at the other half portion of all contact points between the brushes 230 and 231 and the wafer 202.

In addition, in Fishkin, while rotation directions of the brushes 51a and 51b have the same direction as a rotation direction of the wafer at one half portion of all contact points between the brushes 51a and 51b and the wafer, the rotation directions of the brushes 51a and 51b have a direction opposite to the rotation direction of the wafer at the other half portion of all contact points between the brushes 51a and 51b and the wafer.

Generally, a plurality semiconductor devices are cut and produced from wafer disclosed in Moinpour and Fishkin. In this case, cleaning is just important for each semiconductor device, not for an overall surface of the wafer. Thus, the cleaning is fully ensured although the brushes and wafer are operated like Mainpour and Fishkin. However, in the claimed invention, all

surfaces of the substrate are used for display. Thus, the cleaning against of all surfaces of the substrate should be fully ensured. Therefore, in case that the brushes and the substrate are operated in the claimed invention, the cleaning against of all surfaces of the substrate can be fully ensured. If the brushes and the wafer of Moinpour and Fishkin are applied to the claimed invention, the cleaning against of all surfaces of the substrate is never fully ensured. As a result, Moinpour and Fishkin fail to disclose this feature of the claimed invention.

None of the cited references, singly or in combination, teach or suggest at least these features of the claimed invention.

Accordingly, Applicant respectfully submits that claims 13 and 45 and claims 16, 18 and 34-35, which respectively depend therefrom, are allowable over the cited references.

Applicants believe the foregoing amendments and remarks place the application in condition for allowance and early, favorable action is respectfully solicited.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

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Respectfully submitted,

By: */Valerie P. Hayes/*
Valerie P. Hayes
Registration No.: 53,009
McKENNA LONG & ALDRIDGE LLP
1900 K Street, N.W.
Washington, DC 20006
(202) 496-7500
Attorneys for Applicant